

EXECUTIVE SUMMARY

PURPOSE

This interim report recommends comprehensive planning for stormwater management, using a basin-wide approach driven by local needs, and a collaborative effort among existing agencies to meet those needs. Proactive planning, rather than reactive planning, allows consideration of options that may no longer be feasible after development occurs.

The purpose of this report is to present hydrologic and hydraulic characteristics of the watershed for existing and projected land use conditions, and to identify current and potential future stormwater issues.

STORMWATER QUALITY

Urban Runoff

Macroinvertebrate samples were collected at three locations on the Little Salt Creek mainstem. The sampling shows a healthier community exists at the upstream-most site, diminishing in the downstream direction. The upstream site is above the saline soils found along Little Salt Creek, one is at Waverly Road and the third is at Arbor Road. No water quality data has been collected by the City in the Little Salt Creek watershed. Evaluation of water quality samples collected by the City at five Lincoln sites indicates that stormwater quality within the City appears to be relatively good compared to national runoff quality data. The five monitoring sites are located in basins selected by the Public Works and Utilities Department to collect runoff data from typical watersheds. Available data indicates the parameters most frequently observed at elevated concentrations include TSS, COD, oil and grease, and nutrients.

High natural salinity and agricultural runoff likely contribute to the diminished water quality observed during sampling for macroinvertebrates. The deeply incised channel in the lower and middle reaches of Little Salt Creek today stems from changes made to the Salt Creek channel alignment in the first half of the 1900s and from the resulting Salt Creek channel degradation induced by channel straightening. Channel banks must be stabilized and flow rates controlled in the upper reaches of Little Salt Creek, or the banks will become similar to deeply incised channel found in the lower reaches of Little Salt Creek.

Erosion and Sedimentation in Streams

As described above, the channels are deeply incised in Lower Little Salt Creek and the lower portions of its tributaries due to the changes made to the Salt Creek channel alignment in the first half of the 1900s and from the resulting Salt Creek channel degradation induced by channel straightening. Sediment deposition is visible in portions of the N-4 channel.

Erosion and Sediment from Land Disturbance Activities

There are few defined channels in UPZ N-1 (see Figure E-1). Most of the defined channels do not show significant degradation, although they have been heavily modified by commercial development. Culverts are providing hard points that arrest bed degradation. The Lower Little Salt Creek watershed is largely agricultural with many well-maintained best management practices (BMPs) installed. Agricultural land is exempt from the EPA NPDES permit requirements set forth in the Clean Water Act. Crop land within the city zoning jurisdiction is less likely to have BMPs installed or maintained. Channel and bed erosion is a significant source of sediment throughout the watershed. Construction sites are another potential source of erosion and sediment. Management of construction site erosion and sediment is currently required by city, state, and federal law. This

stormwater issue can best be addressed through implementation of city and NRD standards outlined in the Lincoln Stormwater Drainage Criteria Manual. A subdivision with residential and commercial land uses is underway near North 27th Street and Interstate 80. The developer has been proactively addressing erosion and sediment control at this high profile location.

STORMWATER QUANTITY

Flooding Along Streams and Channels

Flooding along stream and channels is confined, with few exceptions, to land currently used for agricultural purposes. Although acreages have sprouted up across the watershed, many are not subject to flood hazard. However, since the floodplain in the Little Salt Creek watershed is an Unnumbered A Zone on the FEMA maps, development has occurred in or near the floodplain without the benefit of delineated water surface profiles. An acreage near North 14th and Arbor Road appears to be at risk of inundation. Several other homes in the watershed also appear to be subject to flood hazard. Most localized flooding problems within the basin are due to undersized culverts at road crossings. Development in the Salt Creek floodplain has occurred with the benefit base flood elevations.

EVALUATION

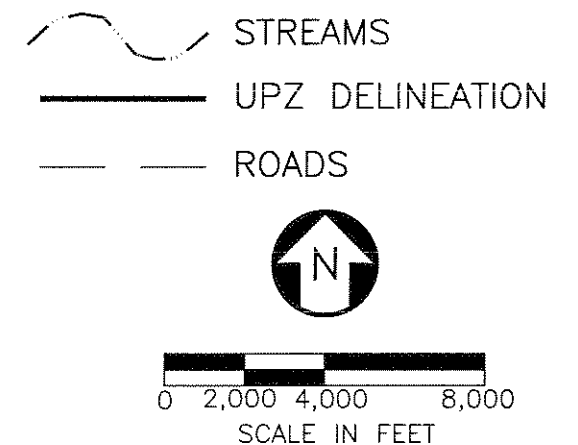
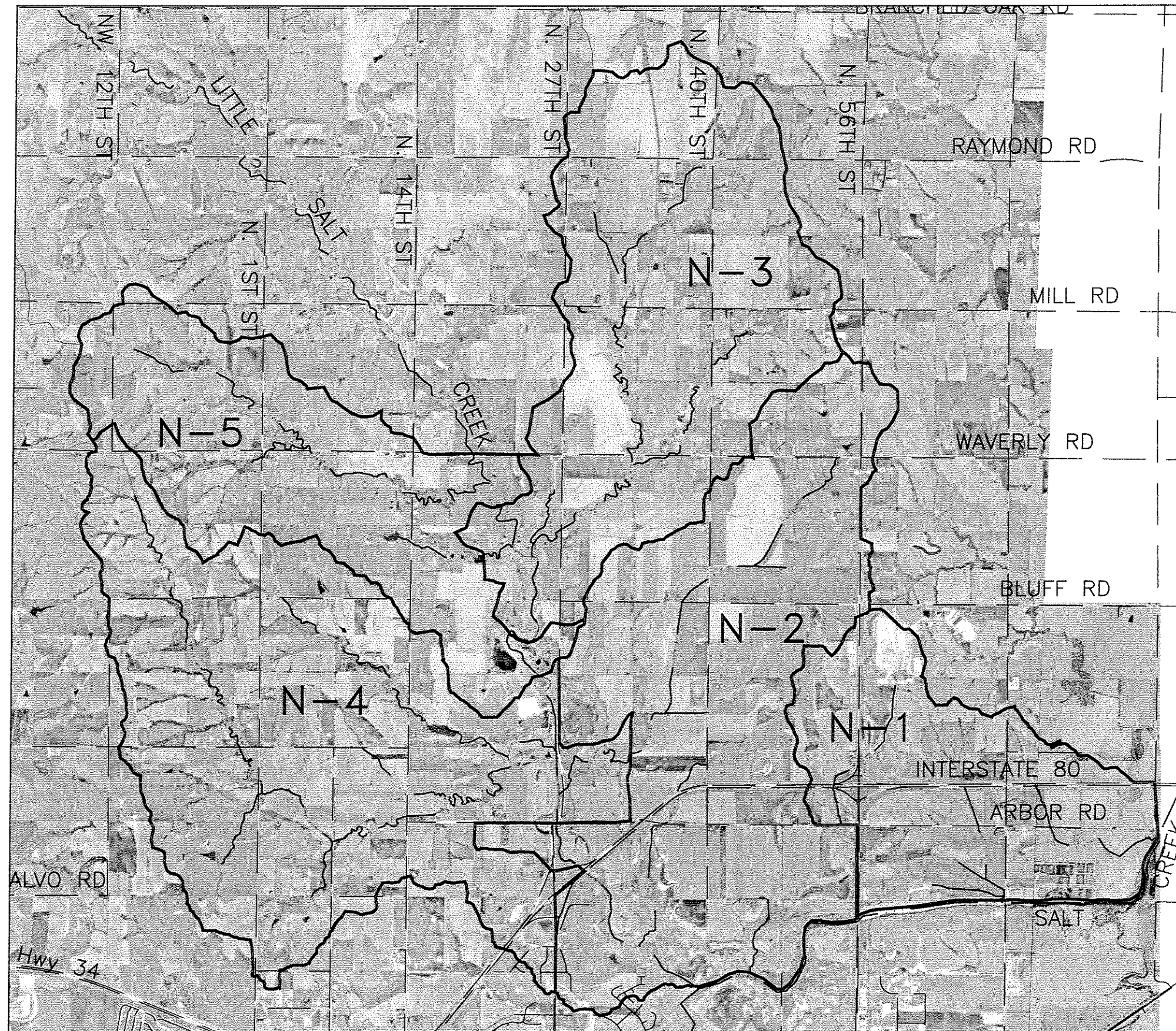
Agricultural land use is the predominant category type in UPZs N-2, N-3, N-4, and N-5. Commercial and industrial land uses are the predominant category type in UPZ N-1. The Lincoln Lancaster County Comprehensive Plan (LLCCP) Land Use Plan dated 28 May, 2002 indicates residential, commercial and industrial development is projected for UPZ N–1 and part of UPZ N–2. Lower Little Salt Creek (most of N-2, and all of N-3, N-4, N-5) is not included in the Tier I growth area, which means additional development is not expected in the next 25 years. The Mayor’s Salt Creek Tiger Beetle Cabinet Report recommended additional study of the potential impacts of urbanization on the Salt Creek Tiger Beetle habitat be completed before additional development is allowed the watershed.

All projected land use changes in the Lower Little Salt Creek Watershed east of 27th Street occur south of Interstate 80. Projected land use changes west of 27th Street occur south of Arbor Road. Areas east of 48th Street flow directly into Salt Creek, the rest flow directly into Little Salt Creek. These areas are identified as Tier 1 growth areas in the LLCCP, refer back to Land Use discussion near the beginning of this report. The four subwatersheds (most of N-2 and all of N-3, N-4, and N-5) that discharge to Little Salt Creek do not have projected land use changes.

Land use changes projected in the LLCCP for UPZ N-1 and parts of UPZ N-2 would increase peak flow rates from the subbasins in those areas. As these subbasins urbanize, each development would be required by City standards to limit runoff at the property line after development to predevelopment rates. Typically, this requirement is met using stormwater storage facilities (detention ponds). In some specific locations, when it has been clearly demonstrated to the City that detention would be detrimental, the detention requirement has been waived.

Most of the subbasins projected to urbanize drain directly to Salt Creek and many of those are in the Flood Insurance Study (FIS) delineated floodplain for Salt Creek. Three tributaries convey runoff from subbasins north of Interstate 80 to Salt Creek and have subbasins that are expected to urbanize. For analysis purposes, theoretical detention ponds were added to the watershed model at the outlet of each subbasin to evaluate the potential performance of detention ponds in those subbasins. The NRCS procedure for quick estimation of storage volume requirements for a known release rate provided in TR-55 was used to select approximate potential detention pond operating characteristics.

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Watershed Boundary Map
Interim Stormwater Hydrology and Hydraulics Report for Lower Little Salt Creek Watershed

FIGURE: E-1

Tables ES-1, ES-2, and ES-3 display peak flow rates for stormwater runoff, which were for both existing and projected land use conditions, as specified in the LLCCP. The tables illustrate the impacts of urbanization on peak stormwater flow rates if the watershed were developed in accordance with traditional development patterns in the City of Lincoln. Potential peak runoff rate increases from the subbasins were modeled using a range of flows , the highest being nearly 300% of the existing flows. These projections indicate what could happen if the potential stormwater impacts of urbanization were not adequately anticipated and mitigated.

The hydrologic and hydraulic modeling, which has been done for UPZs N-1, N-2, N-3, N-4, and N-5 comprise a database of information intended to serve as the basis for stormwater master planning of the Lower Little Salt Creek watershed.

During the course of the analyses, substantial environmental issues arose regarding habitat of the Salt Creek Tiger Beetle, which exists within the Little Salt Creek stream channel and floodplain. The Salt Creek Tiger Beetle is included on the State of Nebraska list of threatened and endangered species and is a candidate for the federal list.

Consequently, the City of Lincoln has suspended stormwater master planning efforts in the Lower Little Salt Creek watershed until the Salt Creek Tiger Beetle issues can be more fully investigated and understood.

Stormwater detention options were evaluated for subbasins located within the Tier 1 growth area outlined in the LLCCP. Where beneficial, local stormwater detention was incorporated into the projected conditions models. In some areas implementing detention actually increased the downstream peak flows by delaying the local peak stormwater runoff and making it coincidental with the regional peak. A description of the detention analyses and findings is provided on page 34.

Table ES-1
2-year Peak Flow Rate Values at Selected Locations in the Lower Little Salt Creek Watershed

Location	Model Identifier	Existing	Projected	
	HEC-1	Q, cfs	Q, cfs	% Increase
N-1 Tributary				
Arbor Road	N1K-N1	145	178	23%
N-2 Tributary				
North 48 th Street	N2Z-P1	165	165	0%
Interstate 80	N2Z-R1	165	165	0%
Arbor Road	N2X-N1	264	385	46%
Direct Discharge to Salt Creek				
See Figure I-10	N2W	116	305	163%
See Figure I-10	N1L-N1	162	456	181%
See Figure I-10	N1M-R1	50	102	104%
See Figure I-10	N1N	27	63	133%
See Figure I-10	N1O	112	112	0%
See Figure I-10	N1Q	53	211	298%
See Figure I-10	N1R	109	109	0%
See Figure I-10	N1H	126	126	0%

Table ES-2
10-year Peak Flow Rate Values at Selected Locations in the Lower Little Salt Creek Watershed

Location	Model Identifier	Existing	Projected	
	HEC-1	Q, cfs	Q, cfs	% Increase
N-1 Tributary				
Arbor Road	N1K-N1	315	367	17%
N-2 Tributary				
North 48 th Street	N2Z-P1	362	362	0%
Interstate 80	N2Z-R1	335	335	0%
Arbor Road	N2X-N1	551	728	32%
Direct Discharge to Salt Creek				
See Figure I-10	N2W	280	545	95%
See Figure I-10	N1L-N1	393	791	101%
See Figure I-10	N1M-R1	117	193	65%
See Figure I-10	N1M	53	107	102%
See Figure I-10	N1O	227	227	0%
See Figure I-10	N1Q	116	357	208%
See Figure I-10	N1R	238	238	0%
See Figure I-10	N1H	292	292	0%

Table ES-3
100-year Peak Flow Rate Values at Selected Locations in the Lower Little Salt Creek Watershed

Location	Model Identifier	Existing	Projected	
	HEC-1	Q, cfs	Q, cfs	% Increase
N-1 Tributary				
Arbor Road	N1K-N1	503	586	17%
N-2 Tributary				
North 48 th Street	N2Z-P1	636	636	0%
Interstate 80	N2Z-R1	645	645	0%
Arbor Road	N2X-N1	907	1142	26%
Direct Discharge to Salt Creek				?
See Figure I-10	N2W	496	826	67%
See Figure I-10	N1L-N1	696	1169	68%
See Figure I-10	N1M-R1	212	296	40%
See Figure I-10	N1M	86	158	84%
See Figure I-10	N1O	367	367	0%
See Figure I-10	N1Q	195	526	170%
See Figure I-10	N1R	400	400	0%
See Figure I-10	N1H	506	506	0%